USGS and DOI Aviation Management Directorate Partnership

- Aviation Safety Programs
- Aircraft Management Services
- Procurement of Aircraft
- Service Contracts
- Coordination of Assets
- DOI UAS CONOPS

Operational Procedures Memorandum 11-11

- Operator Certification
  - Multiple T-Hawk and Raven Courses will be held in FY-2012
- Operator Currency Requirements
- Aircraft Safety Inspection Criteria
- Certificate of Authorization Process

USGS

Dept. of the Interior - UAS Fleet – RQ 11 Raven A

Raven UAS provides USGS and our partners with an enterprise level, low cost, low risk UAS capability to "cut our teeth"- Systems transferred from DoD-Army to DOI-USGS

- Operator training and certification
- Develop user applications and standard operational procedures
- Establish air worthiness inspection criteria
- GAP Analysis- sensors, platforms

Aircraft (3 Each)

Day Payload (3 Each)

IR Payload (2 Each)

GCS Components

Field Repair Kit

Description

Wing Span	4.5 ft
Air Vehicle Weight	4 lbs
Range	10+ km (LOS)
Airspeed	27-60 mph
Altitude	>300 AGL
Endurance	90 min Lithium
Payload	EO/IR Full Motion Video
	GPS- Radio uplink & down link
GCS/RVT	- Combined Weight – 14 lbs

Characteristics

- Rapidly deployed
- Decentralized planning and execution
- Cost effective
- Easily transportable

Raven Operational Mission Sets

- Remote reconnaissance and surveillance
- Damage assessment
- Resource inventory Support

Benefits/Capabilities

- Provides enhanced situational awareness by providing expanded reconnaissance and surveillance coverage.
- Hand-launched
- GPS
- Manual or fully autonomous operations with in-flight retasking
- Commanded auto-loiter at sensor point of interest
- Executes lost link recovery procedures

USGS

Manufacturer: AeroVironment

Dept. of the Interior - UAS Fleet – T-Hawk

Provides DOI-USGS with a UAS designed to meet the needs for a Reconnaissance and Surveillance (R&S) System with hover, persistent stare, and vertical launch/land capabilities. Systems Transferred from DoD- Army to DOI-USGS

Capabilities:

- Field level asset
- Single person portable
- Operates in complex terrain
- Manual or automated flight

AV Weight	18 lbs
System Weight	51 lbs
Range	10 km
Endurance	47 minutes
Payload	EO/IR/LD/LRF Sensor
Max Speed	45 mph
Flight Characteristics	Hover and Stare Capable

Potential Applications:

- Observing wildfire behavior
- Verification- Validation of test sites
- Archeological Site (cliff art) Mapping
- Small area photogrammetric projects
- Damage assessments
- Dam Inspections
- Monitoring Volcanic Activity

Manufacturer: Honeywell

DOI UAS Project Descriptions:

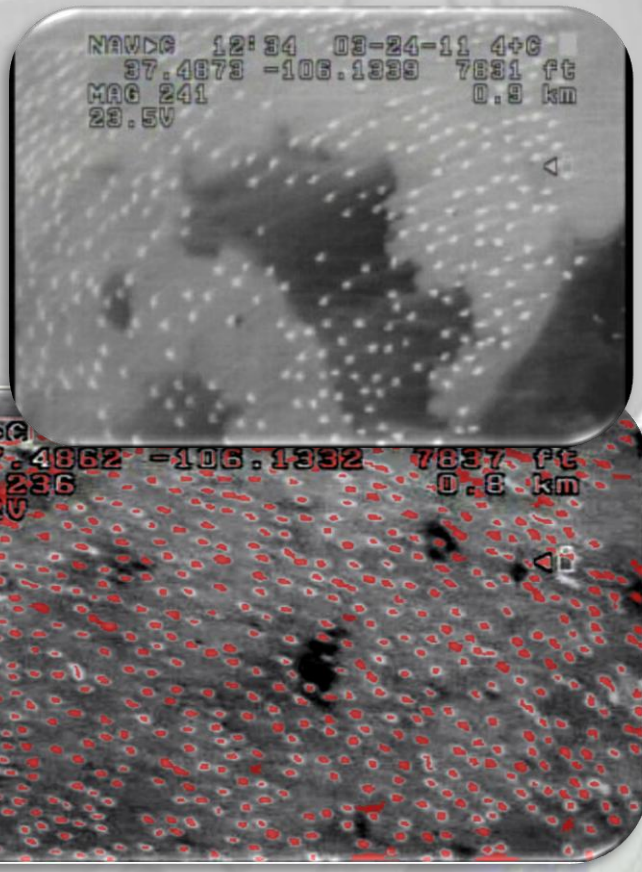
- Training- Maintain Operator Currency (Idaho)
- Wildfire Support - Prescribed Burns (Florida)
- Sandhill Crane Population Inventory (Colorado)
- Rangeland Health Survey - Pygmy Rabbit Habitats (Idaho)
- Thermal Surveys of Lakes and Streams (Montana)
- Monitor Impacts of Missouri River Flooding (S. Dakota)
- Coal Seam Fires and Mine Monitoring – (W. Virginia)
- Monitoring Impacts of Elwha Dam Removal – (Washington)
- EPA Superfund Site - (Delaware)
- Haleakala National Park – (Hawaii)
- Mohave Desert – (California)
- Sage Grouse Habitat (Colorado)
- Moose, Wild Horses & Burro Population Inventory (CO & WY)
- Forest Health Inventory- Pine Beetle Infestation (Colorado)
- Mapping Dinosaur Tracks (Colorado)
- Glacier Temperature Study (Washington, Montana)
- Geologic Hazards – Landslides
- Badlands National Park Monitoring (S. Dakota)
- Carlsbad Caverns National Park (New Mexico)
- Wildfire (U.S.)
- Dam Inspections

USGS

UAS – Sandhill Crane Population Counts – Monte Vista National W.R.

"ALCON - this is a great example of teamwork and the power of collaboration. My hat's off to each of you for a successful mission. The work you do is not only important, it is vital to the success of the Department and the nation! Good stuff! Thanks much!"

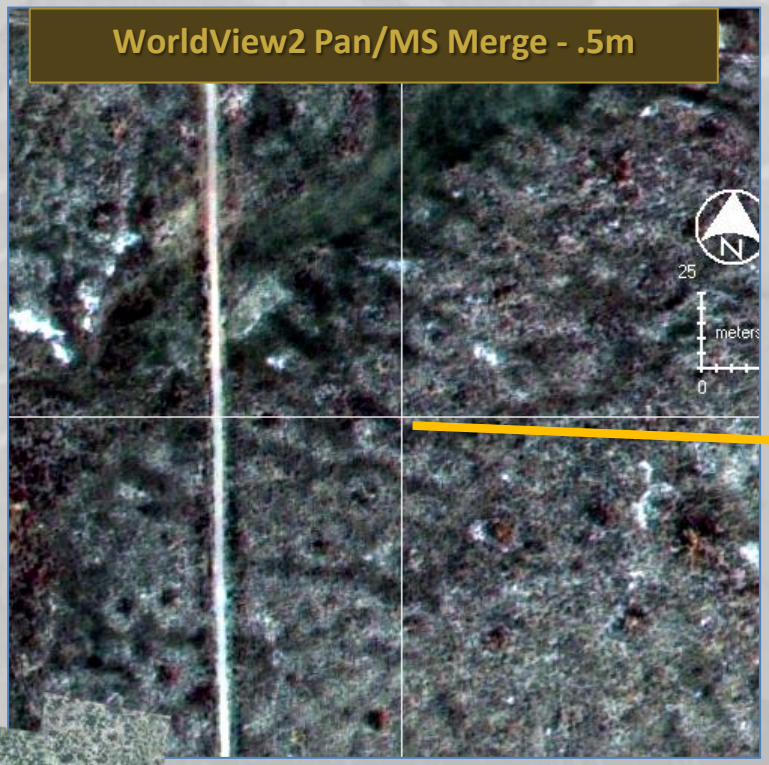
-Joseph Ward Director DOI National Business Center



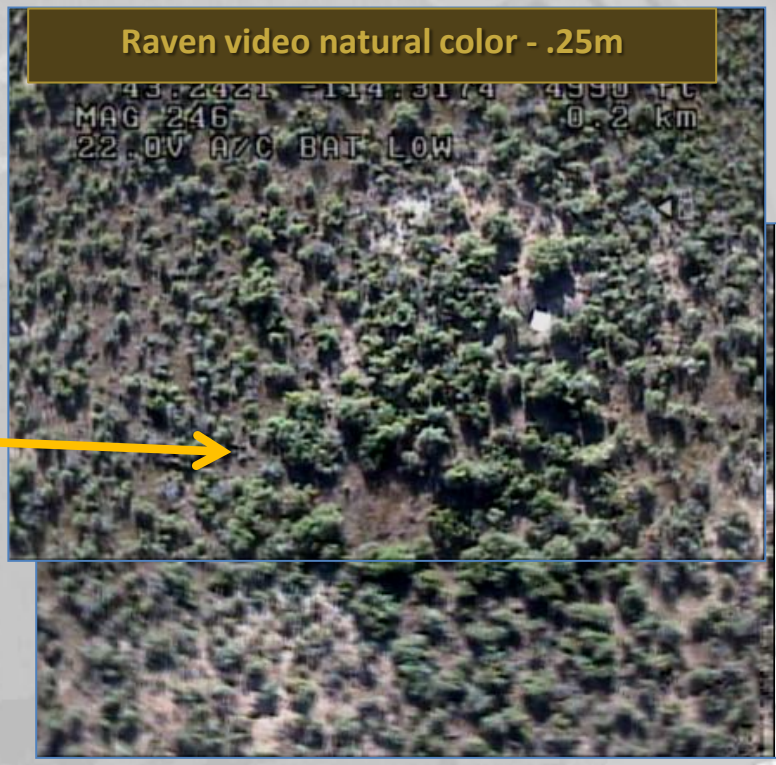
USGS

UAS – Landscape Habitats (Pygmy Rabbit)- Magic Reservoir, Idaho

WorldViewz Pan/MS Merge - .5m



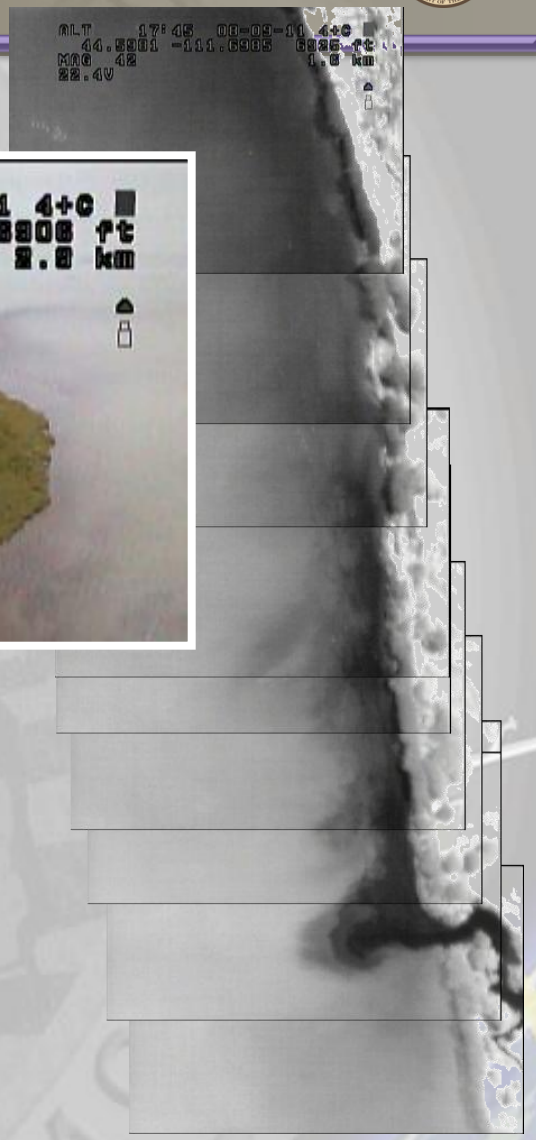
Raven video natural color - .25m



USGS

UAS – Water Thermal Discharge – Red Rock Lakes, Montana

Raven Natural Color Video Capture



Raven IR Video Capture

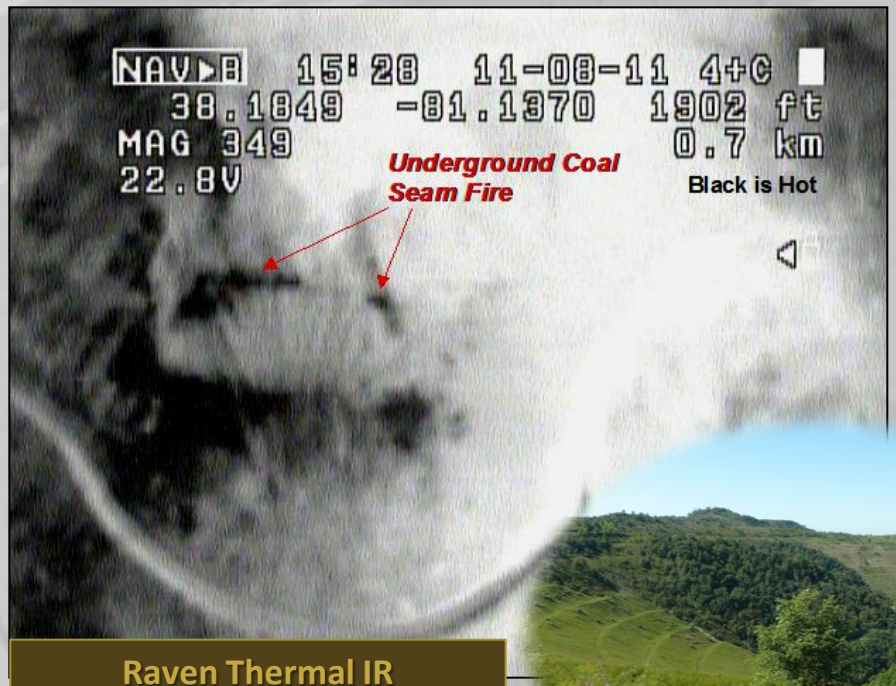
USGS

UAS – Missouri River Erosion - South Dakota

USGS

Raven video natural color

UAS – OSM Mine Surveys – West Virginia

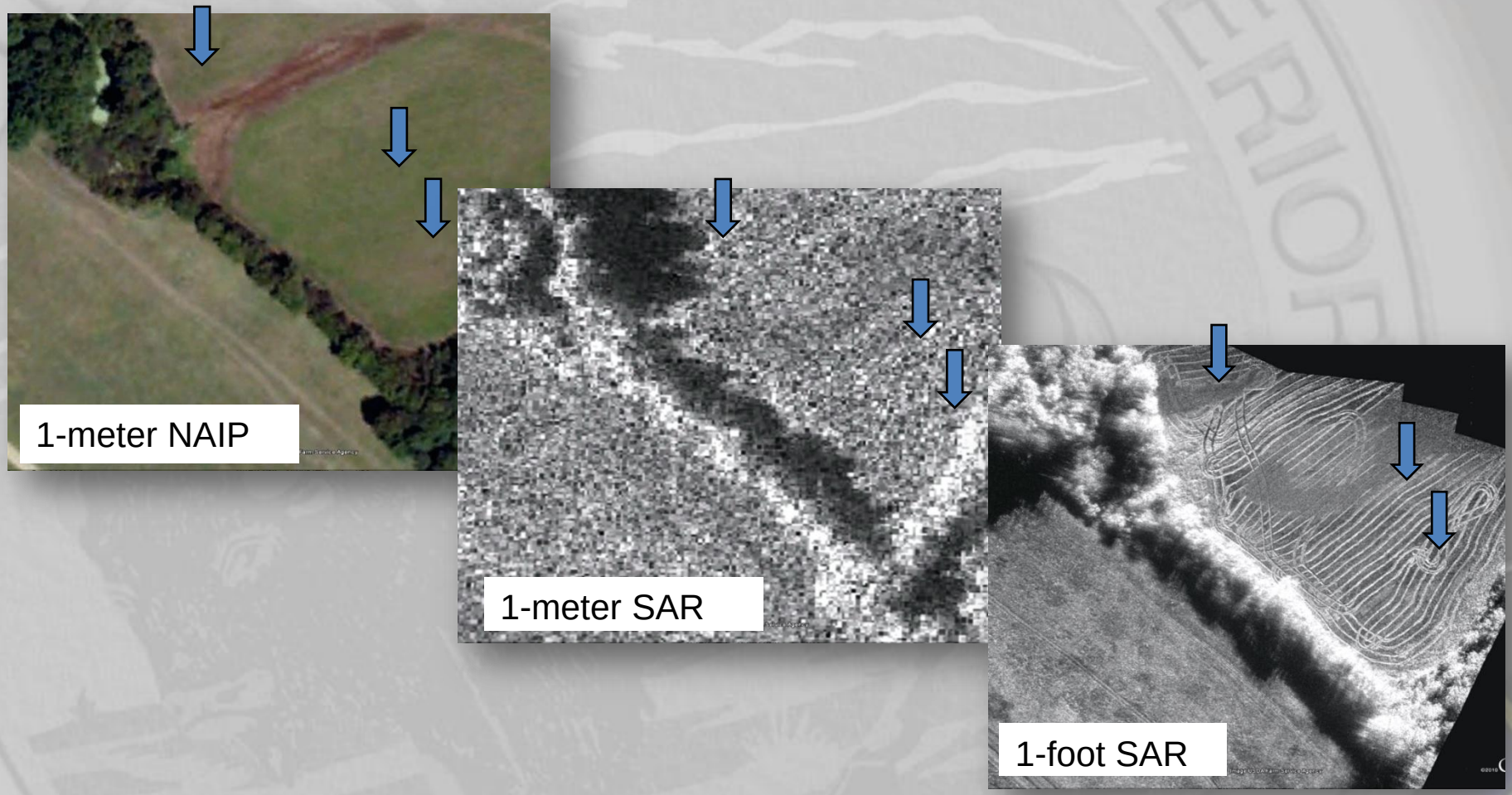


Raven Thermal IR

Raven video natural color

USGS

UAS - Advanced Sensor Research – 2011 Mississippi River Inundation Case Study



Comparison of 1-ft vs 1-m resolution SAR imagery. Blue arrows depict surface disturbance (likely agricultural activity).

USGS

Camera Selections and Specifications

GoPro Hero2HD

- Rugged HD (11M pixel)design at a reasonable cost
- Self-contained battery power and storage card. USB down load only. No set-up
- Still image timer for precise image capture
- No GPS so positional information must be multiplexed and written onto image via post processing.
- Fixed wide field lens causes some “fisheye”
- NTSC output and external USB downloads.
- 2.5”X2.25”X1.625”
- 3.3Oz.

Contour HD

- 2M pixel HD sensor with built in GPS
- Self-contained battery and micro SD card
- Still images at 3 second intervals
- H264 video. USB Set up and down load
- 135 deg lens
- 4”X2”X1.3”
- 5 Oz.

USGS

Initial Camera Testing and Integration

Photoscan- Photogrammetric Image “Point Cloud”

USGS